



### Titles

Arp 220 Revealed, *Rudolph E. Schild*, 24  
 Artistic Sundials of Japan, *Naosuke Sekiguchi*, 415  
 Asteroid for the Asking, *An, J. Kelly Beatty*, 127  
 Astrometric Lens Capers, *An, Arthur Hoag*, 214  
 Astronomers, Congress, and the Large Space Telescope, *Paul A. Hanle*, 300  
 Birkeland and the Electromagnetic Cosmology, *Anthony L. Peratt*, 389  
 Blacu's Failed Celestial Globe, *Deborah Jean Warner*, 294  
 Cygnus X-3: Cosmic-Ray Powerhouse, *David H. Smith*, 497  
 Elijah Burritt and the "Geography of the Heavens," *Peggy Aldrich Kidwell*, 26  
 Enigma Called Io, The, *David Morrison*, 198 (correction, 395)  
 Fantastic Voyages of Digistar, The, *Charles D. Smith*, 6  
 Galactic Jets: Two Exotic Cases, *Ronald A. Schorn*, November, 1984; correction to, 293

HST: Astronomy's Greatest Gambit, *J. Kelly Beatty*, 409  
 Leiden Observatory: 350 Years of Astronomy, *Willem Bijleveld and W. Butler Burton*, 119  
 Martin Ryle, Pioneer Radio Astronomer, *F. Graham Smith*, 123  
 Maxwell's Last Frontier, *Mark Washburn*, 212  
 Moon, The — A Second Time Around? *Mark Washburn*, 209 (correction, 395)  
 More Sites for Observing Halley's Comet, *Edward M. Brooks*, 485  
 Mysteries of Cosmic Jets, *David H. Smith*, 213  
 Pluto and Charon: The Dance Begins, *J. Kelly Beatty*, 501  
 Radar Tour of Venus, *A. J. Kelly Beatty*, 507  
 Relics of Creation, *Paul Davies*, 112  
 Ringed Planets: Still Mysterious — II, *Jeffrey N. Cuzzi*, 19  
 Scientific Challenge of Space Telescope, The, *Malcolm Longair*, 306  
 Seven Dwarfs, The, *David H. Smith*, 216 (correction, 317)

Shuttle Gallery, A, 14  
 Sizing Up the Planets, *Stephen P. Meszaros*, 404  
 Sky-Gazer's Almanac 1985, 47  
 Space Telescope Science Institute, *Wallace Tucker*, 295  
 Supernovae: Mileposts of the Universe, *David H. Smith*, 18  
 Upcoming Mutual Events of Jupiter's Moons, *Kaare Aksnes and Fred Franklin*, 116  
 VB 88: Brown Dwarf or Planet? *Ronald A. Schorn*, 126  
 Visitor's Guide to NASA, A, 102  
 VLBA — A Continent-Size Radio Telescope, *Mark A. Gordon*, 487  
 What Color Is the Solar System? *Andrew T. Young*, 399  
 Why Mount Wilson Shouldn't Be Scrapped, *Leif J. Robinson*, 197  
 W. M. Keck Observatory: When \$36 Million Isn't Enough, *Leif J. Robinson*, 223  
 Worlds of Don Davis, The, 503

### Authors

Aksnes, Kaare, and Fred Franklin, Upcoming Mutual Events of Jupiter's Moons, 116  
 Aldrich, Michael R., letter, 5  
 Archenhold, G. H., letter, 101  
 Armstrong, Alex C., letter, 484  
 Baetens, Chris, An Easy Chair for Binocular Viewing, 171  
 Bathal, Ragbir, John Tebbutt: Australia's Premier Comet Observer, 160  
 Baum, Richard, book review, 417  
 Beatty, J. Kelly, An Asteroid for the Asking, 127  
     HST and the Military Edge, 302  
     HST: Astronomy's Greatest Gambit, 409  
     Pluto and Charon: The Dance Begins, 501  
     Radar Tour of Venus, A, 507  
 Beck, M. Linwood, letter, 100  
 Bijleveld, Willem, and W. Butler Burton, Leiden Observatory: 350 Years of Astronomy, 119  
 Bortle, John E., Comet Digest, 88, 187, 285, 376, 473, 578  
 Bowen, Keith P., O.D., Binocular Astronomy: Is There a Difference? 572  
 Boyd, Louis J., see Genet, Russell M.  
 Briggs, John W., letter, 484  
 Brooks, Edward M., More Sites for Observing Halley's Comet, 485  
 Brunner, Bernard H., letter, 484  
 Bull, Christian, A Charge-Coupled Device for Amateurs, 71  
 Burton, W. Butler, see Bijleveld, Willem  
 Cavagna, Marco, letter, 5  
 Coles, Charles H., letter, 208  
 Collins, Michael, book review, 514  
 Crosswell, Ken, letter, 100  
 Cuzzi, Jeffrey, Ringed Planets: Still Mysterious — II, 19  
 Davidson, Kris, letter, 484  
 Davies, Paul, Relics of Creation, 112  
 Davis, Lincoln K., A Rugged Amateur Scope of Yore, 562  
 Delvo, Piero, Point-Diffraction Interferometry Made Easy, 167  
 di Cicco, Dennis, Waiting for the Comet, 472  
 Drobnock, George John, Photoelectric Data Reduction, 158  
 Dunham, David W., Lunar Occultation Highlights for 1985, 58  
     Planetary Occultations of Stars in 1985, 56  
 Dunham, Miriam P., letter, 4  
 Eagle, David, Software Available, 544  
 Epstein, Eugene E., letter, 100  
 Fabian, Andrew, book review, 128  
 Feuchter, Christopher A., Computer Benchmarks, 546  
 Fiala, Alan D., book review, 129  
 Franklin, Fred, see Aksnes, Kaare  
 Fried, Robert, letter, 292  
 Genet, Russell M., Louis J. Boyd, and Mark Trueblood, Stepper-Motor Control of Telescopes — I, 350; II, 448  
 Gingerich, Owen, Astronomical Scrapbook, 206, 406  
     letter, 196

Gordon, Mark A., VLBA — A Continent-Size Radio Telescope, 487  
 Gray, Robert H., A Small SETI Radio Telescope, 354  
 Green, Daniel W. E., book review, 418  
 Greenstein, Jesse L., book review, 515  
 Hahn, Hermann-Michael, letter, 4  
 Halliday, Ian, letter, 196  
 Hanle, Paul A., Astronomers, Congress, and the Large Space Telescope, 300  
 Harrington, Philip, A Messier Marathon, 81  
 Hart, Thomas A., letter, 100  
 Hays, Robert H., Jr., letter, 4  
 Herring, Phil, letter, 388  
 Hicks, Robert D., book review, 33  
 Hilliard, Elizabeth, letter, 101  
 Hoag, Arthur, An Astrometric Lens Capers, 214  
 Hobish, Mitchell K., book review, 420  
 Hoffelder, T. C., letter, 388  
 Holder, Herbert E., How High Are Lunar Mountains? 62  
 Houston, Walter Scott, Deep-Sky Wonders, 85, 180, 282, 374, 474, 574  
 Hughes, Jene D., An Economical Homemade Mount, 74  
 Hunstead, Richard W., letter, 293  
 Johnson, Ben, A Family of Calculator Clocks, 361  
 Johnson, Douglas, letter, 208  
 Kemp, James C., letter, 4  
 Kidwell, Peggy Aldrich, Elijah Burritt and the "Geography of the Heavens," 26  
 King, Arthur C., letter, 293  
 Knacke, Roger, letter, 388  
 Koch, Bernd, and Norbert Sommer, Capturing Faint Nebulae with Contrast Enhancement, 83  
 Kozai, Yoshihide, letter, 196  
 Lightfoot, Dale R., A Constant Power Source for Accessories, 75  
 Lomborg, Jon, book review, 320  
 Longair, Malcolm, The Scientific Challenge of Space Telescope, 306  
 Loudon, Jim, letter, 484  
 Lovi, George, book review, 130  
     Rambling Through . . . (current month) Skies, 45, 143, 239, 335, 431, 529  
 Luft, Herbert A., letter, 293  
 Lula, Brian, A 12½-inch Newtonian-Cassegrain, 264  
 MacRobert, Alan, Backyard Astronomy, 124, 397  
     book review, 324  
     Case of the Aries Flasher, The, 148  
     How To Report a Fireball, 372  
     Pluto Flies by Two Stars, 341  
     RR Lyrae Observing Program, An, 538  
     Satellites of Saturn, The, 436  
     Telescopic Views, 118  
 Marriott, R. A., Clark, Dawes, and the Birth of Temple Observatory, 450  
 Marshall, Laurence A., book review, 517  
 Marsden, Brian G., book review, 322

Marshall, Kevin P., letter, 292  
 Matsumoto, Tatsuro, Fiberglass for an Observatory Dome, 558  
 Mayer, Ben, letter, 293  
 McDonough, Thomas R., letter, 292  
 McFeely, Jim, letter, 292  
 Marriott, R. A., Clark, Dawes, and the Birth of Temple Observatory, 450  
 Mertz, Lawrence, letter, 5  
 Meszaros, Stephen P., Sizing Up the Planets, 404  
 Miller, Alice, letter, 292  
 Minton, R. B., Spectral Lines, 545  
 Morgan, Jeffrey S., Io and the "Jovian Nebula," 202  
 Morgan, John A., book review, 34  
 Morrison, David, The Enigma Called Io, 198 (correction, 395)  
 Neely, Richard W., letter, 4  
 Neus, Mike, Shutter Speeds for Astrophotography, 544  
 Nichol, John R., Some Modifications to a Hindle-Type Grinding Machine, 267  
 O'Meara, Stephen James, Philip Stooke: A Mapper of Worlds, 551  
     Star of San Diego, The, 258  
     Visual Recovery of Halley's Comet, The, 376  
 Osterbrock, Donald E., letter, 100  
 Otis, Michael G., Image Processing: Another Way, 449  
 Owen, Michael R., letter, 196  
 Page, Thornton, book review, 229  
     letter, 100  
 Paine, Thomas O., book review, 321  
 Peratt, Anthony L., Birkeand and the Electromagnetic Cosmology, 389  
 Pettingill, Dwyndal, Lighted Setting Circles, November, 1984; correction to, 4  
 Raymo, Chet, book review, 32  
 Richter, John L., Rx for the Newtonian Telescope, 456  
 Robertson, Timothy J., A Filar Micrometer for Comets and Double Stars, 359  
 Robinson, Leif J., Why Mount Wilson Shouldn't Be Scrapped, 197  
     W. M. Keck Observatory: When \$36 Million Isn't Enough, 223  
 Roques, Paul, letter, 4  
 Sanford, Scott, and Robert Walker, letter, 388  
 Sato, Takeshi, Chiro: Tale of a Japanese Legend, 64  
 Schild, Rudolph E., Arp 220 Revealed, 24  
 Schorn, Ronald A., book reviews, 131, 228, 323  
     Galactic Jets: Two Exotic Cases, November, 1984; correction to, 293  
     VB 88: Brown Dwarf or Planet? 126  
 Sekiguchi, Naosuke, Artistic Sundials of Japan, 415  
 Sheffer, Yaron, letter, 388  
 Sinnott, Roger W., Optical Innovator Dies, 461  
     Waxing and Waning Moon, The, 254  
 Slabinski, Victor J., Small Angular Distances Reconsidered, 158

Smith, Charles D., The Fantastic Voyages of Digistar, 6  
 Smith, David H., book review, 31  
 Cygnus X-3: Cosmic-Ray Powerhouse, 497  
 Mysteries of Cosmic Jets, 213  
 Seven Dwarfs, The, 216 (correction, 317)  
 Supernovae: Mileposts of the Universe, 18  
 Smith, F. Graham, Martin Ryle, Pioneer Radio Astronom-  
 mer, 123  
 Smith, Jonathan R., letter, 5  
 Sommer, Norbert, see Koch, Bernd  
 Speare, William, letter, 5  
 Stinebring, Daniel R., letter, 292  
 Sykora, Larry Carl, Is NGC 4689 Really M91? 373  
 Talbot, John C., A Merry-Go-Round Binocular Chair, 172

Texereau, Jean, letter, 101  
 Trimble, Virginia, letter, 100  
 Troiani, Daniel M., letter, 5  
 Trueblood, Mark, see Genet, Russell M.  
 Tucker, Roy A., letter, 196  
 Tucker, Wallace, The Space Telescope Science Institute,  
 295  
 Turco, Edward, letter, 484  
 Usher, Peter D., book review, 226  
 Victor, Robert C., 1985 Planet Preview, A, 54  
 Sun, Moon, and Planets This Month, The, 52, 146,  
 242, 338, 434, 536  
 Venus Misses the Sun, 244  
 Vranjican, Mladen, M.D., Thin Glass, Thick Plaster, 75

Waldron, Arthur N., letter, 101  
 Walker, Robert, see Sandford, Scott  
 Warner, Deborah J., Blau's Failed Celestial Globe, 294  
 Washburn, Mark, book review, 225  
 Maxwell's Last Frontier, 212  
 Moon, The — A Second Time Around? 209  
 Weitzenhoffer, Kenneth, Chaucer, Two Planets, and the  
 Moon, 278 (correction, 317)  
 Williams, James G., letter, 4  
 Wingate, Bruce, Observatory Fires, 268  
 Wolf, Graham W., New Zealand's Solo Eclipse Team, 257  
 Young, Andrew T., What Color Is the Solar System? 399  
 Young, Robert R., letter, 292  
 Zinns, J. S., letter, 196

## Departments and Features

### Amateur Astronomers —

Amateur Briefs, 357  
 Astronomy Day, 259  
 Chiro: Tale of a Japanese Legend, 64  
 Clark, Dawes, and the Birth of Temple Observatory, 450  
 Discovering Comet Levy-Rudenko, 66  
 Halley Battle Plans, 357  
 John Tebbutt: Australia's Premier Comet Observer, 160  
 June Gatherings and Other Events, 550  
 New Zealand's Solo Eclipse Team, 257  
 Philip Stooke: A Mapper of Worlds, 551  
 Radio Telescope for Amateurs, A, 162  
 Small SETI Radio Telescope, A, 354  
 Star of San Diego, The, 258  
 Stellafane, 550  
 Tuthill Comet Award, 162  
 Upcoming Meetings, 357

### Astronomical Computing —

Astronomical Software, 449  
 Bits and Bytes, 158  
 Computer Benchmarks, 546  
 How High Are Lunar Mountains? 62  
 Image Processing: Another Way, 449  
 Photoelectric Data Reduction, 158  
 Shutter Speeds for Astrophotography, 544  
 Small Angular Distances Reconsidered, 158  
 Software Available, 544  
 Spectral Lines, 545  
 Stepper-Motor Control of Telescopes — I, 350; II, 448  
 Waxing and Waning Moon, The, 254

### Astronomical Scrapbook —

Astronomy of Alfonso the Wise, The, 206  
 Ptolemaic Astronomy for an Emperor's Eyes, 406

### Backyard Astronomy —

Close-Up of a Star, 397  
 Lure of the Variables, The, 124

### Books and the Sky —

Astronomical Scrapbook, The, Joseph Ashbrook, 417  
 Astrophysics and Twentieth-Century Astronomy to  
 1950, Part A, Owen Gingerich, editor, 515  
 Astrophysics I: Stars; II: Interstellar Matter and Galax-  
 ies, Richard L. Bowers and Terry Deeming, 34  
 Beyond Vision, Jon Darius, 31  
 Canon of Solar Eclipses — 2003 to +2526, Hermann  
 Mucke and Jean Meus, 129  
 Comets: A Descriptive Catalog, Gary W. Kronk, 418  
 Early Man and the Cosmos, Evan Hadingham, 33  
 Entering Space: An Astronaut's Odyssey, Joseph P. Al-  
 len with Russell Martin, 514  
 Exploring the Night Sky with Binoculars, David Chand-  
 ler, 130  
 Genesis on Planet Earth, William Day, 420  
 Glimpsing an Invisible Universe, Richard F. Hirsh, 128  
 Hilltop in Foggy Bottom, A, Jan K. Herman, 131  
 In the Presence of the Creator, Gale Christianson, 226  
 James E. Keeler, Pioneer American Astrophysicist,  
 Donald E. Osterbrock, 323  
 Light-Hearted Astronomer, The, Ken Fulton, 324  
 Never at Rest: A Biography of Isaac Newton, Richard  
 S. Westfall, 226  
 New Atlas of the Universe, The, Patrick Moore, 517  
 New Race for Space, The, James E. Oberg, 321  
 Newtonian Revolution, The, I. Bernard Cohen, 226  
 Nightwatch: An Equinox Guide to Viewing the Uni-  
 verse, Terence Dickinson, 32  
 Orbits for Amateurs with a Microcomputer, D. Tatters-  
 field, 322  
 Out of the Cradle: Exploring the Frontiers Beyond  
 Earth, W. Hartmann, R. Miller, and P. Lee, 320  
 Prelude to the Space Age: The Rocket Societies,  
 1924-1940, Frank H. Winter, 229  
 Serendipitous Discoveries in Radio Astronomy, K. Kel-  
 lerman and B. Sheets, editors, 228

Solar System, The, Roman Smoluchowski, 225  
 Star Splitters, The, Wallace H. Tucker, 128  
 Starwatch, Ben Mayer, 130  
 To Know the Stars, Guy Ottewill, 130

### Briefly Noted, 36, 132, 229, 325, 422, 519

### Celestial Calendar —

Adding Your Horizon to the Planet Chart, 60  
 Amphitrite in Libra, 437  
 Asteroid Occultations, 245, 342  
 Case of the Aries Flasher, The, 148  
 Comet Mania Spreads as Halley Approaches, 54  
 Eastern Hemisphere Lunar Eclipse, 437  
 Jupiter's Satellites, 52, 146, 242, 338, 434, 536  
 Lunar Occultation Highlights for 1985, 58  
 Meteors, 60, 342, 437  
 Minima of Algol, 60, 150, 246, 341, 437, 541  
 Moon Phases and Distances, 53, 150, 243, 342, 435, 537  
 Mutual Events of Jupiter's Satellites, 541  
 1985 Planet Preview, A, 54  
 Occultation Reminders, 150, 342, 540  
 Planetary Occultations of Stars in 1985, 56  
 Pluto Flies by Two Stars, 341  
 Polar Solar Eclipse, A, 437  
 RR Lyrae Observing Program, An, 538  
 Satellites of Saturn, The, 436  
 Sun, Moon, and Planets This Month, The, 52, 146,  
 242, 338, 434, 536  
 Trapezium Variable in Eclipse, 246  
 Uranus and Neptune This Year, 341  
 Variable Star Maxima, 60, 150, 244, 342, 435, 541  
 Venus in Daylight, 340  
 Venus Misses the Sun, 244  
 Vesta at Naked-Eye Brightness, 342  
 Vesta in Virgo, 149

### 50 and 25 Years Ago, 5, 101, 215, 293, 391, 500

### Front-cover photographs —

Don Davis' Orion Nebula, 481  
 Hubble Space Telescope, 289  
 Hubble Telescope Primary Mirror, 385  
 Just Part of the Job, 1  
 M87 and Its Jet, 193  
 Tropical Eclipse, 97

### Gleanings for ATM's —

Charge-Coupled Device for Amateurs, A, 71  
 Constant Power Source for Accessories, A, 75  
 Easy Chair for Binocular Viewing, An, 171  
 Economical Homemade Mount, An, 74  
 Family of Calculator Clocks, A, 361  
 Fiberglass for an Observatory Dome, 558  
 Filar Micrometer for Comets and Double Stars, A, 359  
 Lighted Setting Circles, November, 1984 (correction, 4)  
 Merry-Go-Round Binocular Chair, A, 172  
 Observatory Fires, 268  
 Optical Innovator Dies, 461  
 Point-Diffraction Interferometry Made Easy, 167  
 Rugged Amateur Scope of Yore, A, 562  
 Rx for the Newtonian Telescope, 456  
 Some Modifications to a Handle-Type Grinding Ma-  
 chine, 267  
 Thin Glass, Thick Plaster, 75  
 12½-inch Newtonian-Cassegrain, A, 264

### Letters, 4, 100, 196, 292, 388, 484

### News Notes —

Advanced Technology Telescope, 106  
 "Ampte" Christmas Stocking, An, 312  
 Are Blue Compact Galaxies Young? 11  
 Are We Inside a Supernova Remnant? 13  
 Ashes of the Stars, 491  
 ASP Awards, 13, 494  
 AST Camera Fund, 312  
 Astron Observes Lead, 110  
 Astronomy Newsletter for Teachers, 10  
 Better Clocks, 494

Bushnell Science Awards, 492  
 Chair of Space History Established at Smithsonian, 395  
 Charon at Last? 312 (correction, 395)  
 Chretien Award, 219  
 Cine-CCD, 13  
 Dark-Nebula Catalogue for Southern Skies, A, 108  
 Did Comet Halley's Tail Cause a Geomagnetic Storm in  
 1910? 110  
 Eclipse Blindness: A Casualty Report, 315  
 Edison Award Recipient, 316  
 End of a Pyramid Myth, 496  
 Exhibiting the Stars, 392  
 First X-Rays from a Nova, 495  
 Flip-Flop Radio Jets? December, 1984; correction to, 111  
 Galactic Center Found? 317  
 Gale Observatory: Just for Undergraduates, 9  
 Glimpse of the Helioopause? A, 111  
 Globes, Globes, Globes, 495  
 Globular Statistics, 108  
 "Great Comet" of 1985, The, 492  
 Halley's Comet: Closing In, 392  
 Heart of M33, The, 395  
 Horsehead Nebula, The: A Bok Globule in the Making? 12  
 How Deep Are Crater Rays? 316  
 Independent Origins for Pluto and Triton, 218  
 Japanese Deep-Space Probe Launched, 222  
 Keeping Tabs on Supernovae, 222  
 Kitt Peak's First Employee, 110  
 Last Aerobee Launched, 496  
 Lifetimes of Comets, 394  
 Magnetic White Dwarf, 312  
 Markarian Connection, The, 218  
 Milky Way, The: Gaining Weight? 394  
 Minor Planet Names, 220  
 Mixtec Mixup, 106  
 More Space Films, 393  
 M76, The Magnetic Nebula, 314  
 Nearby Supernova, A — The Professional's Dilemma, 9  
 Nearest Gravitational Lens, 315  
 New Class of Radio Sources, 494  
 New Course Offering, 393  
 New Ear for the South, 495  
 New Evidence on the Hubble Parameter, 220  
 New Light on Galactic Evolution, 493  
 Nuclei of Arp 299, The, 10  
 P. A. M. Dirac, 1902-84, 107  
 PG 1159 — 035: A Pre-White Dwarf, 493  
 Pinpointing the Stars, 222  
 QSO Trio, 219  
 Ring for Neptune, A? 314  
 Ring of Galaxies, 107  
 Soviet Halley Probes Launched, 111  
 Soviets Set Space Endurance Mark, 107  
 Space Toys, 492  
 Spica's Nebula, 493  
 SS 433: Jets Caught in the Act, 109  
 Stephan's Quintet: New Light on an Old Puzzle, 396  
 Supernova's Superwind, 11  
 Supernova Twins Not Identical, 491  
 Swapping Globular Clusters, 491  
 Tarnished Stars, 317  
 Teachers in Space, 108  
 Tracking a Quasar to Its Lair, 392  
 Two Meteorite Falls, 222  
 UGC 6697: Ring or Spiral Galaxy? 110  
 Unique Shuttle Film, 313  
 Van Biesbroeck Award, 396  
 Variable Stars, Small 'Scopes, 317  
 Violent Star Formation Regions, 393  
 Water-Vapor Masers and Starburst Galaxies, 11  
 What Powers the Lagoon Nebula? 220  
 White-Light Solar Flares, 10  
 William G. Hoyt: Historian of Astronomy, 317  
 Young Astronaut Program, 219

# Observer's Page —

Binocular Astronomy: Is There a Difference? 572  
Capturing Faint Nebulae with Contrast Enhancement, 83  
Chaucer, Two Planets, and the Moon, 278  
Comet Digest, 88, 187, 285, 376, 473, 578  
Comet Levy-Rudenko, 1984i, 88  
Deep-Sky Wonders, 85, 180, 282, 374, 474, 574  
How To Report a Fireball, 372

Is NGC 4689 Really M91? 373  
Items from the Observers' Notebook, 470  
Last November's Two Eclipses, 281  
Messier Marathon, A, 81  
Nebula Filter Excitement, 86  
November's Chancy Eclipse, 183  
Sunspot Numbers, 87, 182, 284, 375, 476, 577  
Visual Recovery of Halley's Comet, The, 376  
Waiting for the Comet, 472

Rambling Through . . . (current month) Skies —  
Concerning Halley Hype, 529  
Distance Dilemma, The, I, 45; II, 143  
Faint Neighbors Nearby, 431  
Tangled Sky Names, 335  
Where Should Planetariums Head? 239  
Southern Stars for . . . (current month), 44, 238, 430  
Stars for . . . (current month), 46, 144, 240, 336, 432, 530

## Selected Topics and Celestial Objects

This listing is not intended to be exhaustive and does not supplant the other parts of the index. For example, material in such regular features as Books and the Sky is ordinarily indexed only under the Departments and Features section.

Amateur astronomy: Astronomy Day, 259; Brohman, Michigan, club, 292; how to observe variable stars, 124; IAPPP workshop, 292; Messier marathon, 81, 388; SETI radio telescope, 354  
Archaeoastronomy: Maya glyphs, 33; Mixtec drawing, 106; pyramid alignment, 496  
Art: cartography of planets, 551; Don Davis pictorial, 503; Pamela Lee's cave on Io, 320  
Asteroids: Amphitrite, 127; naming, 220; 1983 TB, 470  
Astrometry: automated transit circle at La Palma, 222; new Lowell astrophotography, 214; stellar parallax, 45  
Awards: ASP, 13, 494; Bushnell science, 492; Tutill, 162; Van Biesbroeck, 396  
Binoculars: chairs for, 171, 172; observing with, 572; Yerkes eyepiece, 572  
Black holes: Cygnus X-3, 497  
Calendars: for Moon phases, 255  
Clusters: statistics on globular, 108; 'n galaxies, 491.  
Globular — M4, 574; M13, 216; NGC 6144, 574; NGC 6453, 574. Open — Christmas Tree, 180; Melotte 111, 475; Pleiades, 84; Stock 23, 283; M6, 574; M7, 574; M35, 85; M44, 182; NGC 1502, 283; NGC 2158, 85; NGC 2264, 180; NGC 6231, 574  
Comets: AMPTE artificial, 312; and cataclysms, 4; *Boston Globe*, artificial, 492; Canterbury Swarm and Encke's, 101, 292; discovering Levy-Rudenko, 66; Halley mania, 54, 529; lifetimes of, 394; visual recovery of Halley's, 376; where to observe Halley's, 196, 293, 485; Austin, 1984i, 187; Great 1843, 450; Great 1881, 161; Levy-Rudenko, 1984i, 88, 285, 376, 473, 578; P/Arend-Rigaux, 1984k, 187, 376; P/Giacobini-Zinner, 1984e, 473, 578; P/Halley, 1982i, 88, 110, 187, 285, 293, 376, 392, 472, 473, 578; P/Schau-masse, 1984m, 88, 187, 376; P/Shoemaker, 1984q, 182, 473; P/Tsuchinshan 1, 376; Tebbutt, 1861 II, 161  
Computers: and stepper motors, 350, 448; benchmarks, 546; image processing, 315, 449; magnetic-field studies with supercomputers, 390. Program listings — for astrophotography, 545; lunar heights, 63; lunar phases, 254; photometry, 158; spectrum study, 546  
Constellations: Big Dipper, 124; Cygnus, 497; naming of, 235; Sagittarius and Scutum, 575  
Cosmology: Birkeland's "terrella," 389; cosmic dust, 388; cosmic jets, 213; Cygnus X-3, 497; Hubble parameter, 220; nearest gravitational lens, 315; quantum strings, 112  
Double and multiple stars: Albireo as an optical double, 4; Antares, 574  
Earth: "black smoker," 31; Cretaceous-Tertiary extinction, 196; visibility of Great Wall from space, 101  
Eclipses: blindness casualty report, 315; November, 1984, lunar, 281; November, 1984, solar, 183, 257, 281; photographic exhibition of solar, 5  
Education: ASP and AAS teacher newsletter, 10; new astronomy course, 393  
Galaxies: Arp 299 nuclei, 10; center of Milky Way, 317; evolution of, 493; globulars in, 491; M91 and NGC 4689, 373; Northern Hemisphere distribution of, 309; nucleus of M33, 395; regions of violent star formation in, 393; seven dwarf, 216; water-vapor masers and starburst, 11; weight of Milky Way, 394; young blue compact, 11; Abell 1060, 306; Arp 220,

24; Holmberg I, 217; Holmberg II, 217; Klemola 25, 107; Leo A, 217; Leo I, 216; Leo II, 216; Markarian 205, 218; Sextans A, 217; Sextans B, 216; Stephan's Quintet, 396; M33, 395; M78, 81; M80, 574; M81, 473; M82, 25, 473; M86, 374; M87, 213, 488; M95, 390; M100, 18; NGC 1569, 283; NGC 1961, 283; NGC 2366, 283; NGC 2403, 283; NGC 2523, 283; NGC 2537, 374; NGC 2672, 182; NGC 2749, 182; NGC 2764, 182; NGC 2683, 374; NGC 2793, 374; NGC 2832, 374; NGC 2859, 374; NGC 3165, 374; NGC 3187, 390; NGC 4032, 475; NGC 4038, 474, 475; NGC 4064, 475; NGC 4151, 308; NGC 4361, 475; NGC 4383, 475; NGC 4874, 475; NGC 4889, 475; NGC 5172, 475; NGC 5641, 475; UGC 6697, 110  
High-energy astronomy: Cygnus X-3, 497; magnetic white dwarfs, 312; M76 as a magnetic nebula, 314; sizes of rapidly variable radiation sources, 5; SS 433, 109; X-rays from Nova Muscae 1983, 495  
History: Apianus and Ptolemaic astronomy, 406; astronomy of Alfonso X, 206; Blau's celestial globe, 294; Burritt's "Geography of the Heavens," 26; Chaucer and the conjunction of 1385, 278; De la Rue 1860 solar observing party, 515; Leiden Observatory, 119; saving Herschel house, 101; Venus' phases in 1610-11, 196  
Jupiter's satellites: Io, 198; lineup, 5; mutual events, 116  
Mars: maps of Phobos and Deimos, 551; Rima Tenuis, 5  
Meteorites: two recent falls, 222  
Meteors: how to report fireballs, 372; Quadrantids, 470; sounds from, 100; August 8, 1926, fireball, 372; April 25, 1966, fireball, 372  
Milky Way: around Sagittarius and Scutum, 575; center of, 317; mass of, 394  
Moon: Copernicus, 316; depth of crater rays, 316; illusion, 388; returning to the, 209  
NASA: visitor's guide to, 102  
Nebulae: around Spica, 493; Bok globule in Horsehead, 12; catalogue of dark, 108; Hubble's variable, 180. Diffuse — Lagoon, 220; Rosette, 181; Simeis 147, 83; IC 353, 84; IC 1995, 84; M1, 85; M78, 81; NGC 2261, 180; NGC 2264, 180; NGC 2359, 85; NGC 2392, 85. Planetary — Baade 1, 85; IC 418, 85; IC 443, 85; M76, 82, 314; NGC 2022, 85  
Neptune: origins of Triton and Pluto, 218; possible ring, 314  
Novae: Muscae 1983, 495; Vulpeculae 1984 No. 2, 258, 471  
Observatories: Gale, 9; Keck, 223; Leiden, 119; Mount Wilson, 197, 293  
Observatories, amateur and public: fire prevention in, 268; Shirakawa, Japan, 64; Temple, 450  
Personal notes: Alfonso X, 206, 484; Allen, J., 514; Apianus, P., 406; Atwater, G., 292; Birkeland, K., 389; Bleau, W. J., 294; Chaucer, G., 278; Chiro, 64; Clark, A., 450; Collins, P., 258; Dawes, W. R., 451; de Sitter, W., 120; Devik, K., 389; Dirac, P. A. M., 107; Dunham, T., 4; Galle, J., 293; Giacconi, R., 296; Golson, J. C., 110; Halley, E., 292; Keeler, J., 323; Kinsey, J., 298; Kraus, J., 316; Kutter, A., 461; Levy, D., 66; Meier, R., 162; Newton, I., 226; Payne-Gaposchkin, C., 100; Ritchey, G. W., 100;

Rudenko, M., 66; Ryle, M., 123; Scaliger, J. J., 120; Schreier, E., 296; Stephens, D. O., 208; Stoll, C., 298; Stooke, P., 551; Tebbutt, J., 160; Wilson, O. C., 13; Wolf, G., 257  
Planetariums: Infinitum, Japan, 393; Richmond's Digistar projector, 6, 239  
Pluto: and Charon, 312, 501; darkness of, 196; origin of, 218  
Pulsars: Crab, 128  
Quasars: and NGC 3842, 219; Markarian 1014, 392; 3C 273, 213; 3C 345, 487  
Radio astronomy: G 5.3 — 21.0, 494; G 357.7 — 0.1, 494; maps of SS 433, 109; solar, 196; Venera 15 and 16, 507; water-vapor masers and starburst galaxies, 11, 489  
Saturn: rings, 19; spokes, 21  
Solar system: colors of planets and moons, 399; ringed planets, 19, 314; sizes of surface features, 404  
Space and spacecraft: Aerobee launch, 496; AST camera fund, 312; burials in, 484, 491; EUVE, 212; films, 393; Galileo, 127; Hubble Space Telescope, 295, 300, 306, 409; IMAX shuttle film, 313; Japan's MS-TS "Sakigake," 222; manned flight no. 100, 388; sending teachers into, 108; Shuttle lottery, 484; Shuttle pictorial, 14; Smithsonian chair of history, 395; Soviet endurance record, 107; Soviet Halley probe, 111; Space Telescope Science Institute, 295; toys in, 492; Venera 15 and 16, 507; visitor's guide to NASA, 102  
Stars: "Aries flasher," 148; Bethlehem, 208; flaring, 4, 196, 484; magnetic white dwarf, 312; naming of, 317, 335; "Nemesis," 4; PG 1159 — 035, 493; planet or brown dwarf around VB 8, 126, 484; Spica, 493; workshop on neutron, 292; violent formation of, 393  
Sun: heliopause of, 111; sunspots, 397, 398; techniques for beginning observer of, 397; white-light flares, 10  
Sundials: Japanese, 415  
Supernovae: as distance indicators, 18; catalogue of, 222; how to study nearby explosions, 9; in M100, 18; wind from, 11. Remnants — G 11.2 — 0.3, 491; Sun inside a, 13  
Telescopes and telescope making: Australia Telescope (radio), 495; Buil's CCD, 71; Cine-CCD, 13; curved spiders, 458; Davis' pipe mounting, 562; Delvo's interferometer for optical testing, 167; Gray's SETI radio, 354; Hughes' economical mount, 74; Mount Wilson solar tower, 197; Nichol's Hindle-type grinding machine, 267; Ross corrector for a Newtonian, 456; VLBA (radio), 487; Westerbork radio array, 122; Tebbutt's 8-inch Grubb, 160; Dawes' 8 1/4-inch Clark, 450; Kutter's 12-inch schiefspiegler, 461; 20-inch Lowell, 214; 33-inch Chiro Memorial, 65; 36-inch Lick, 101; 2.3-meter Australian, 106; 2.4-meter HST, 295, 300, 306, 409; 100-inch Mt. Wilson, 100, 197; 200-inch model, 100; 10-meter Keck, 223  
Time: from modified calculators, 361; stored-ion laser-cooled clocks, 494  
Uranus: rings, 23  
Variable stars: beginning techniques for observing, 124; RR Lyrae observing program, 538; RS Ophiuchi, 471; FG Sagittae, 100; symposium on, 317  
Venus: maps of, 552, 553; radar images of, 507; thin crescent of, 340